

**IN THE CLAIMS:**

1 1. (Original) A method of determining resistance in a fuel cell, including the steps  
2 of:

3 (A) measuring an initial stack current and stack voltage;

4 (B) changing fuel cell stack load across the fuel cell;

5 (C) substantially immediately reading the output voltage and current of the  
6 fuel cell; and

7 (D) calculating the resistance of the fuel cell.

1 2. (Original) The method of determining resistance in a fuel cell, as defined in claim  
2 1, including the further steps of:

3 (A) coupling constant current with the fuel cell to set stack current;

4 (B) waiting a predetermined time period for the output voltage of the fuel cell  
5 to stabilize;

6 (C) measuring the output voltage of the fuel cell;

7 (D) changing the fuel cell current;

8 (E) substantially immediately reading the output voltage of the fuel cell; and

9 (F) calculating the resistance of the fuel cell.

1 3. (Original) The method of determining resistance, as defined in claim 2 including  
2 the further step of

3 evaluating any changes in said calculated resistance over time as a measure of  
4 fuel cell hydration.

1 4. (Original) The method of determining resistance in a fuel cell, as defined in claim  
2 1, including the further steps of:

- 3 (A) switching a fixed resistance load onto said fuel cell;
- 4 (B) allowing the fuel cell stack voltage to stabilize at a first voltage level;
- 5 (C) removing the fixed resistance;
- 6 (D) substantially immediately measuring the new stack voltage; and
- 7 (E) calculating the fuel cell resistance based upon the change between the first  
8 voltage level and the new stack voltage.

1 5. (Currently Amended) The method of determining resistance as defined in claim 1  
2 including the further steps of:

- 3 (A) providing a DC-DC converter with an associated microcontroller;
- 4 (B) adjusting input parameters of said DC-DC converter, using said microcon-  
5 troller, to establish an initial duty cycle;
- 6 (C) reading the stack voltage and the stack current;
- 7 (D) ~~charging~~ changing the duty cycle;
- 8 (E) substantially immediately measuring the fuel cell voltage and fuel cell cur-  
9 rent; and
- 10 (F) calculating resistance based upon measurements.

1 6. (Original) The method of determining resistance, as defined in claim 1 including  
2 the further step of

3 evaluating any changes in resistance over time as a measure of fuel cell hydration.

1 7. (Original) The method of determining resistance, as defined in claim 1, wherein  
2 said fuel cell comprises one of the following:

- 3 (A) a fuel cell stack;
- 4 (B) a fuel cell array; and
- 5 (C) an individual fuel cell.

1 8. (Original) The method of determining resistance, as defined in claim 3, wherein a  
2 fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a direct  
3 oxidation fuel cell.

1 9. (Original) The method of determining resistance, as defined in claim 4, wherein  
2 said direct oxidation fuel cell is a direct methanol fuel cell.

1 10. (Original) The method of determining resistance, as defined in claim 3, wherein a  
2 fuel cell in said fuel cell stack, said fuel cell array, or said individual fuel cell is a hydro-  
3 gen fuel cell.

1 11. (Withdrawn) A system of measuring resistance of a fuel cell means, comprising:  
2 (A) a fuel cell means which generates an output voltage and an output current;  
3 (B) a fixed load circuit connected in parallel with said fuel cell means respon-  
4 sive to a control signal for switching said fixed load circuit across said fuel cell means;  
5 and  
6 (C) a measuring device coupled to said fuel cell that measures desired parame-  
7 ters related to the resistance across the fuel cell means.

1 12. (Withdrawn) The system as in claim 11 wherein said fuel cell means is a direct  
2 oxidation fuel cell stack.

1 13 (Withdrawn) The system as in claim 11 wherein said fuel cell means is a direct  
2 oxidation fuel cell array.

1 14. (Withdrawn) The system as in claim 11 further comprising a DC-DC converter  
2 circuit having input that is connected to receive the output voltage from said fuel cell

3 means and being responsive to said control signal for varying the opening and closing of  
4 switches within said DC-DC converter such that a load is switched on and off said fuel  
5 cell means and said measuring device has means for measuring the resistance of the fuel  
6 cell means, when said switches are turned on, and when turned off.

1 15. (Original) A method of measuring resistance in a fuel cell stack being used as a  
2 power source, comprising the steps of:

3 (A) using a fuel cell stack to produce power that can be supplied to a battery or  
4 load;

5 (B) switching a fixed load across said fuel cell stack;

6 (C) reading the voltage across the stack after a predetermined time period  
7 when said fixed load circuit is on;

8 (D) turning off the load;

9 (E) substantially immediately reading the stack voltage; and

10 (F) determining stack resistance based upon a change in said stack voltage  
11 readings.

1 16. (Original) A method of measuring resistance across a direct oxidation fuel cell  
2 stack that includes programmable DC-DC switches including the steps of:

3 (A) using said programmable DC-DC switches to switch a load on and off said  
4 fuel cell stack;

5 (B) signaling an associated microprocessor under pulse-width modulation con-  
6 trol to adjust the duty cycle of said DC-DC switches

7 (C) measuring voltage changes as said switches change;

8 (D) calculating a change in resistance over time; and

- 9 (E) predicting cell hydration based upon said changes.